

TITLE

METHOD AND APPARATUS FOR PROVIDING FREQUENT FLYER MILES AND  
INCENTIVES FOR TIMELY INTERACTION WITH A TIME RECORDS SYSTEM

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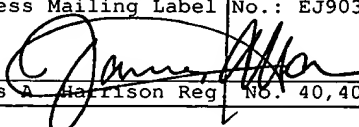
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TITLE: METHOD AND APPARATUS FOR PROVIDING FREQUENT FLYER;  
MILES AND INCENTIVES FOR TIMELY INTERACTION WITH A TIME  
RECORDS SYSTEM

SPECIFICATION  
BACKGROUND

5

Cross Reference to Related Application

This application is related to, incorporates by reference, and claims priority to the filing date of the following application filed by Finch, et al.: "TIME KEEPING AND EXPENSE TRACKING SYSTEM HAVING CUSTOMIZED GRAPHICAL USER INTERFACES", said application having been filed on January 31, 2000 and having a serial number of 60/179,218.

SA 13  
SI 11  
This application is related to and incorporates the following applications by Finch et al. being filed concurrently herewith:

1. "METHOD AND APPARATUS FOR WIRELESS WEB TIME AND EXPENSE ENTRY VIA TIME KEEPING AND EXPENSE TRACKING SERVER ACCESS";
2. "METHOD AND APPARATUS FOR A WEB BASED PUNCH CLOCK/TIME CLOCK";
3. "METHOD AND APPARATUS FOR WIRELESS WEB TIME KEEPING AND EXPENSE ENTRY WITH A CALENDAR PROGRAM/PERSONAL ORGANIZER";
4. "METHOD AND APPARATUS FOR PROVIDING PROMPT PAYMENT FOR TIME ENTRIES ENTERED BY WAY OF A TIME RECORDS SYSTEM";

5. "METHOD AND APPARATUS FOR MONITORING CONTRACTOR PERFORMANCE";

6. "A TIME KEEPING AND EXPENSE TRACKING SERVER THAT GRANTS ACCESS TO RECORDS BASED UPON A USER'S ATOMIC ABILITIES";

7. "A TIME KEEPING AND EXPENSE TRACKING SERVER THAT INTERFACES WITH A USER BASED UPON USER'S ATOMIC ABILITIES"; AND

8. "METHOD AND APPARATUS FOR UNIQUELY IDENTIFYING HARD COPY TIME SHEET FOR CROSS REFERENCE TO SYSTEM RECORDS".

## 1. Technical Field

5 The present invention relates generally to computer based time keeping and expense tracking systems, and more particularly to such a system that may be customized on an entity, group, project, user or other basis.

## 2. Related Art

10 The tracking of workers' time has been required since workers began working on an hourly basis. An early example of hourly time tracking was the punch clock system in which a time card was assigned to each worker. Upon commencing work, the worker had his or her card punched by a clock so that the  
15 work starting time could be recorded. Then, upon ceasing

work, the worker had his or her card punched again so that

the work ending time could be recorded. From these starting and stopping times, a record could be constructed for a larger time period, e.g., a weekly period, a bi-weekly period, etc. This record was then used in preparing a  
5 paycheck for the worker and in creating other records relating to the time worked by a partial or complete work force.

While the punch clock system worked admirably in a factory environment in which all workers worked in a single  
10 location, time keeping was more difficult where a workforce was distributed. For example, employment agencies specialize in placing workers in contract positions within different organizations that also have their own employees. A contract employee, while being paid by an employment agency, reports  
15 to an employee (usually a supervisor) within the company. The contract employee creates a time sheet based upon the work he or she performs and then passes the time sheet to his or her supervisor at the company for approval. When the supervisor approves the time sheet, the supervisor passes the  
20 time sheet to the employment agency. The employment agency then receives the time sheet and typically inputs the time sheet into a computer that produces a paycheck for the employee and bills the company for the employee's time. This process is slow, tedious, prone to errors and expensive. The  
25 cost of the overhead associated with this process may easily

exceed twenty percent of the revenue that the employment agency receives for the employee.

Another difficulty relating to time keeping relates to distributed work forces. Distributed work forces are now the norm, instead of the exception, not only for employment agencies but for companies as well. In a distributed work force, employees/contractors may be distributed worldwide. Each employee/contractor is required to submit time sheets for each pay period. These time sheets are received at a central accounting office, the time entries contained thereupon are then input into a computer system, paychecks are produced, reports are produced, and invoices are produced when required. While faxing or emailing time records to the central accounting office may expedite these operations, substantial effort must be expended in the process.

Organization of time records is another difficulty faced in time keeping. While all employees may work for a single company, the employees may work for different divisions, in different departments, and for different supervisors within the same department. Time records must be segregated according to this organizational structure for accounting and budget tracking purposes. Further, in an employment agency scenario, the employment agency may service tens or hundreds of companies. While each of the contractors works for, and is paid by the employment agency, invoices must be submitted

to the appropriate company. Further, within a particular company, a single contractor may work on more than one project, in more than one division, and for more than one supervisor. The contractor's time must be segregated accordingly when the invoice is submitted. To further complicate this effort, the contractor may be paid at different rates for this work, depending upon the project, division, etc. These complexities further increase the difficulty in not only paying the employee but in generating an invoice for the company.

Expense tracking includes its own difficulties, some of which are shared with time tracking. Expense reports must be prepared on a periodic basis for each member of a workforce, whether he or she is an employee or contractor. These expense reports must be received by an accounting department, allocated to the proper account, and reimbursement checks must be prepared. With a distributed workforce, at least those difficulties described above apply. Proper accounting of expenses and invoicing when required also introduces difficulties to the process. As may be seen, current systems do not readily facilitate time entry and monitoring for modern workforces that have employees that are continuously going from site to site.

Thus, there is a need in the art for a timekeeping and

expense tracking system that overcomes the shortcomings cited above as well as other shortcomings of the prior systems.

SUB A2  
SUMMARY OF THE INVENTION

Thus, to overcome the shortcomings of the prior systems, among other shortcomings, a timekeeping and expense tracking ("TKET") system constructed according to the present invention provides a plurality of users with the ability to  
5 access the system via the internet and via wireless communication networks. The TKET system resides upon at least one server computer coupled to the internet and supports access from computer systems, web enabled telephones, personal data terminals, and other enabled  
10 devices including wireless personal digital assistants (PDAs). The TKET system may therefore be accessed from both wired and wireless devices. In one embodiment, users employ browser software to access the TKET system and require no specialized client software.

15 In order to support the many and varied needs of companies using the TKET system, the TKET system supports configurable graphical user interface screens ("GUI screen"). GUI screens are those displays provided to users of the TKET system when the users access the TKET system. Via the GUI  
20 screens, the users input their time and expense records. The GUI screens are configurable to alter the objects presented, the layout of the objects and information presented, the color schemes presented, the timekeeping or expense tracking information required from the user, and in other ways that  
25 cause the TKET system to be more effective.



GUI screens may be customized on a company-by-company basis, a department-by-department basis, a group-by-group basis, a project-by-project basis, and a user-by-user basis or upon another basis. A single TKET system may be used to  
5 service the time keeping and expense tracking needs of a plurality of companies, each of which has a plurality of divisions, a plurality of departments, a plurality of groups and a plurality of employees/contractors. Thus, the configurability of the TKET system allows differing GUI  
10 screen presentations to be created and presented such that each group of users is employing a different system.

GUI screen preferences for sets of users of the TKET system may be organized in a hierarchical basis to simplify the GUI screen creation and presentation operations. In a  
15 GUI screen preference hierarchy, a top level of the hierarchy possesses a respective set of GUI screen preferences that are sufficient to create a user's GUI screen. Each lower level on the hierarchy also possesses a respective set of GUI screen preferences. Each user serviced by the TKET system  
20 resides at a particular location on the hierarchy. With this hierarchy position determined, a GUI screen may be created for the user. In creating the GUI screen, the user's location in the hierarchy determines his ability level for making changes because he inherits the GUI screen preferences  
25 of all other higher level users in the hierarchy. However,

GUI screen preferences of successively lower levels of the hierarchy displace conflicting GUI screen preferences of higher levels of the hierarchy. Thus, a GUI screen for a particular user of the TKET system will have his or her GUI  
5 screen preferences determined along a top to bottom hierarchy path.

The TKET system also generates GUI screens depending upon the type of terminal from which a user accesses the TKET system and the connection over which the user accesses the  
10 TKET system. A GUI screen created for the user when the user accesses the TKET system from a palm-top computer is simpler than a GUI screen created for the user when the user accesses the TKET system from a desktop computer. Further, when the user accesses the TKET system from a wireless device, the  
15 bandwidth of the available data path from the TKET system to the user's terminal will also be considered. A less complex GUI screen will be created and provided to the user when lesser bandwidth is available over which to transmit the GUI screen to the user. This operating feature is particularly  
20 important when the user accesses the TKET system from a wireless device.

The invention further includes interfacing the TKET server with a calendar application that is hosted on a user terminal that comprises either a desktop computer, a laptop  
25 computer or a personal digital assistant (PDA). In one

embodiment of the invention, the TKET server communicates directly with the calendar application if the TKET server knows the communication protocol for the specific calendar type. In another embodiment of the invention, an application  
5 is installed into the user terminal that serves as an interface between the TKET and the calendar application.

Other aspects of the present invention will become apparent with further reference to the drawings and specification, which follow.

**BRIEF DESCRIPTION OF THE DRAWINGS**

A better understanding of the present invention can be obtained when the following detailed description of the preferred embodiment is considered in conjunction with the following drawings, in which:

5       FIGURE 1 is a system diagram illustrating a multimedia electronic mail system constructed and operating according to the present invention.

10       FIGURE 2 is a functional block diagram illustrating a TKET server coupled to a user terminal according to the present invention.

FIGURE 3 is a functional block diagram that illustrates an expanded TKET server system coupled to a user terminal according to one aspect of the present invention.

15       FIGURE 4 is a software system configuration chart that illustrates to various software layers according to an embodiment of the invention.

FIGURE 5 is a functional block diagram illustrating the relationship between users with respect to a TKET server formed according to the present invention.

20       FIGURE 6 is a chart that illustrates the hierarchical relationship between different users wherein the hierarchical

relationships defined levels of ability to define the characteristics and arrangement of a GUI screen page according to a preferred embodiment of the invention.

FIGURE 7 is an exemplary display of a GUI screen

5 according to one embodiment of the invention.

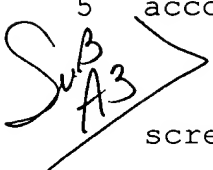
*Sub A3*  FIGURE 8 is an illustration of a series of GUI screen screens that collectively illustrate a concept of users having differing and relative levels of atomic abilities for modifying the contents and arrangement of GUI screen screens according to one embodiment of the invention.

FIGURE 9 is a flow chart that illustrates a method performed by a TKET server for setting GUI screen preferences for a user.

FIGURE 10 is a flow chart illustrating a method for generating a GUI screen page to a user and for receiving data inputs from the user for storing and processing.

FIGURE 11 is a functional block diagram illustrating a TKET server in communication with a user terminal according to an alternative embodiment of the invention.

FIGURE 12 is a table illustrating a method within a TKET server for generating a GUI screen display at a remote terminal according to a preferred embodiment of the invention.

FIGURE 13 is a table determining whether to generate a set of signals for displaying either a full, reduced or

minimal GUI screen display based upon communication path characteristics according to one aspect of the present invention.

FIGURE 14 is a flow chart that illustrates a method  
5 according to the present invention.

FIGURE 15 is a flow chart illustrating an inventive method for receiving time tracking signals from a telecommunication switch according to a preferred embodiment of the invention.

10 FIGURE 16 is a functional block diagram illustrating a network for facilitating timely electronic time entries and approvals according to a preferred embodiment of the invention.

15 FIGURE 17 is a flow chart illustrating a method for entering and approving time entries according to a preferred embodiment of the invention.

FIGURE 18 is a functional block diagram illustrating the circuitry within a time keeping and expense entry server according to one embodiment of the present invention.

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DETAILED DESCRIPTION OF THE DRAWINGS

Sup 44

FIGURE 1 is a system diagram illustrating a time keeping and expense tracking (TKET) system 100 constructed and operating according to the present invention. A TKET server 102 couples to the internet 104 (World Wide Web) and converses with all other devices using one or more packet switched protocols supported by the internet 104. A telephone network 106 (which may be the public switched telephone network ("PSTN") or another telephone network) couples to the internet 104 via a gateway 108. Further, a wireless network 110 couples to the internet 104 via a gateway 112. The manner in which the internet 104 (or other packet switched networks) couples to the telephone network 106 and to the wireless network 110 is generally known. Thus, the interaction between the internet 104 and the other networks 106 and 110 will be described only as it relates to the present invention. And, of course, the structure illustrated in FIGURE 1 is an example structure. Other structures may be constructed and operate according to the present invention to support time keeping and expense tracking operations.

Computers 114 and 116 couple to the internet 104 and may interact with the TKET server 102 through this connection. While computer 114 has a direct connection to the internet 104, computer 116 must access the internet via an internet

Service Provider (ISP) 118. Many users currently access the internet via an ISP, as illustrated with the connection for computer 116. However, some computers currently access the internet via an Intranet or other coupling network. In this construction, an ISP may not be required. Further direct connections to the internet are already possible such as shown with computer 114. Thus, simply stated, the structure illustrated in FIGURE 1 provides a platform of operation for the present invention but must not be constructed to limit the teachings of the present invention.

Web-enabled telephones 124 and 126 couple to the telephone network 106. These telephones 124 and 126 each have displays upon which a GUI screen may be presented to the user. The telephone network 124, as was previously described, may be the PSTN, which transmits data in a PCM format. In another embodiment, the telephone network 124 may be a packet switched network that supports packet-based communications. The teachings of the present invention, therefore, apply equally well to current or future telephone network technology.

Wireless devices 120, 121 and 122 wirelessly connect to the wireless network 110. The wireless network 110 may be cellular based, satellite based or otherwise structured to provide wireless communication service within a service area.

Wireless device 122 is a portable computer that services



communications over a wireless link to the wireless network 110. Wireless devices 120 and 121 are personal data assistants that wirelessly communicate with the wireless network 110. The wireless network 110 communicates with the internet 104 via the gateway 112.

A local area network/wide area network (LAN/WAN) 128 couples to the internet 104 via a firewall 130. At least one computer terminal, e.g., computer 132, couples to the LAN/WAN and may communicate with the TKET server 102 via the LAN/WAN 128 and the internet 128. The LAN/WAN may be supported by a company, a service provider or another organization.

The TKET server 102 may be operated by a single company or a plurality of companies that use the TKET server 102 to support its timekeeping/expenses. Alternately, the TKET server 102 may be operated by an application service provider (ASP) that sells timekeeping and expense services to a plurality of customers. The timekeeping services provided by the ASP may be bundled with other services so that the ASP provides a suite of services to its customers.

According to the present invention, a plurality of users accesses the TKET server 102 via differing communication paths and using differing terminal devices. Time and expense information is uploaded from the terminal devices to the TKET server 102 where it is stored and later used to generate invoices, paychecks, reports, and other alternate records.

15  
5 Because the TKET server 102 is accessible from any location having internet 104 access, the TKET server 102 provides ubiquitous service worldwide. Thus, the TKET server 102 as easily services distributed workforces as it does centralized work forces. For example users at terminal devices 120, 132 126 and 116 may work for a single employer/contractor at differing physical locations. However, in reporting time and expense information, they simply access the TKET server 102 via respective network connections.

10 A single user may use multiple and differing terminal devices to access the TKET server 102. Because of this, the user is not precluded from entering his or her time from a single terminal device. While the user is traveling, he or she may use a portable computer 122 or personal data 15 assistant 121 to enter time. However, while working or at home, the user may use his or her personal computer 114 to enter time and expense information. Thus, as compared to prior timekeeping/expense systems, the TKET server 102 provides a centralized service environment that is not 20 limited by the users' equipment.

The design of the present invention is particularly advantageous in that it allows an employer to monitor time keeping and expense tracking in a real-time manner. Stated differently, by requiring an employee to access the system to 25 enter his start and stop times, the system serves as a time

clock. Moreover, the system includes the flexibility of allowing an employee (user) to enter previously worked by un-entered time. For example, an employee may need to enter travel time.

5 With respect to the time clock feature of the invention, a GUI screen for a user of a wireless PDA terminal 121, for example, may have separate objects for start and stop times. Thus, the PDA may be programmed to establish a connection with the TKET server and to automatically upload a start or  
10 stop time when so requested by the user. With the present system, a PDA may serve as a portable time clock for the user to help him track his time.

Continuing to refer to FIGURE 1, TKET server 102 generates communication signals 134 that are to be delivered  
15 to any one of the plurality of terminals shown in FIGURE 1. The communication signals 134 are created in a form to trigger terminal user software to generate displays containing information defined within communication signals 134. For example, communication signals 134 may include  
20 signals in a form that trigger and that can be used by a plurality from terminal software to create a GUI screen. The form of the communication signals 134 and the content therein directly affect the display at the receiving terminal. For example, communication signals 134 actually comprise a large  
25 number of signals or information that result in a specified

GUI screen being displayed on the terminal display. Thus, either for a terminal having a limited capacity for receiving and handling large amounts of information or for a network path having low bandwidth data throughput capacity, the magnitude or total amount of signals that comprise communication signals 134 will be reduced thereby resulting in the display of a reduced GUI screen page. In the case, by way of example, of a mobile terminal, the signals within communication signals 134 may be so limited that little more than text is transmitted to the terminal.

The communication signals 134 also include control information to prompt the receiving terminal to generate a response indicating a user selection of options or questions asked within the GUI screen for the response signals 136 are received by TKET server 102.

For most user terminals, the response signals 136 use the hypertext transfer protocol (HTTP) that is used by web servers and client browsers to communicate over the World Wide Web. Generally, the protocol is used for moving documents around the internet. Additionally, terminals usually employ hypertext mark-up language (HTML) for creating World Wide Web pages. Accordingly, the TKET server 102 can estimate the capabilities of the terminal, and perhaps the transmission data path from the HTTP and HTML information that is received as a part of response signals 136. As will

5 be explained in greater detail herein this application, TKET server 102 determines the characteristics of the GUI screen display that are to be created at the user terminal according to the content of response signals 136. In addition to the HTTP and HTML information from which TKET server 102 may infer terminal or communication path capabilities, an actual synchronized address selection by the user to which response signals 136 are being routed may be used, in an alternate embodiment, by the TKET server 102 in determining GUI screen display characteristics. Alternatively, response signals 136 may merely include an indication of a user selection from which a corresponding GUI screen display is generated.

10 Other factors are also used by TKET server 102 to determine what GUI screen display signal characteristics are appropriate. By way of example, the TKET server 102 is operable to determine the number of gateways in the transmission path between it and the user terminal from examining the http information associated with a received signal. For example, the network of Figure 1, a Gateway 108 is shown to exist in the path between TKET server 102 and telephones 124 and 126 of telephone network 106. Between TKET server 102 and user terminal 122, there not only exists a Gateway 112, but also a wireless network 110 that introduces substantial propagation delays. Accordingly, by 25 determining how many Gateways exist in the path and other

characteristics of the path such as whether the communication signals are being routed through a telephone network 106, a local area or wide area network 128, or a wireless network 110, as well as the number of Gateways through which communication link passes, TKET server 102 is able to determine an approximate value for throughput capacity. For example, merely having to go through a wireless network 110 might, in the described embodiment, result in TKET server 102 transmitting, at most, a reduced set of display signals for forming a reduced GUI screen display.

FIGURE 2 is a functional block diagram illustrating a TKET server coupled to a user terminal according to the present invention. A user terminal 204 communicates with TKET server 208 by way of interface 212. Interface 212 may comprise any combination of an ISP, a gateway and an internet, a wireless network, a PSTN or any other communication network. TKET server 208 also is coupled to database 216 that is for storing user information including user selected GUI screen display parameters.

TKET server 208 comprises a session interface module 220, a GUI screen definition module 224 and a GUI screen display module 228. Each of these modules operates in concert to support the disclosed invention herein. To illustrate, GUI screen definition module 224 is for storing default GUI screen page parameters and GUI screen display

definition information for creating GUI screen pages on a user terminal display. Additionally, module 224 includes information for defining logic for rearranging, renaming, adding, and deleting time entry or expense tracking components. The specific logic contained therein is better explained in the discussion of the figures that detail operation of the invention.

The inventive system is operable to enable a user to customize the GUI screen displays to a degree not seen in other display systems, and more particularly, in time and expense tracking systems. To enable the user to select display parameters, the inventive system includes a GUI screen display module 208 that creates GUI screen displays according to the definition information stored in GUI screen definition module 224. Additionally, GUI screen display module includes logic for creating displays according to the display parameters selected by the user that are stored within database 216.

Database 216 is for storing customized display parameters selected by a user. For example, the number, arrangement and names of elements within the rows and columns of a GUI screen display page on a per user basis are stored within database 216. In the preferred embodiment of the invention, database 216 is for storing multiple display pages for each user that requires multiple pages.

By way of example, a user may want to define multiple GUI screen pages for display on his terminal screen according to the terminal type. If the user, for example, typically accesses his time and expense tracking system either with a PDA or with a desktop computer terminal, his display capabilities will vary according to the capacity of the terminal in terms of bandwidth, memory, and display processing throughput capacity. Accordingly, database 216 is formed to include software instructions and memory capacity to store multiple GUI screen display pages according to user need and GUI screen display module 208 is formed to include logic for selecting between the multiple GUI screen pages.

In addition to database 216 that stores multiple display pages for each user, session interface module 220 is for determining the terminal type through which the user is accessing the TKET server 208. More specifically, session interface module 220 includes software instructions that define logic for determining the bandwidth and terminal type of the user terminal. The session interface module 220, in one embodiment, produces a GUI screen selector signal for the GUI screen display module 228 to determine what GUI screen display is to be created for the user terminal 204 the GUI screen selector signal.

There are many different ways in which the session interface module 220 may determine the user terminal type.



In one embodiment of the invention, the user specifies his terminal type by selecting a corresponding URL when accessing the TKET server 208. By way of example, the user is instructed to use a first URL for accessing the TKET 208 when the system is being accessed with a PDA and a second URL when the system is being accessed with a desktop or laptop computer.

In another embodiment of the invention, a terminal ID is transmitted to the TKET server 208 that identifies the terminal type. For this embodiment, session interface module examines the contents of a database, e.g., database 216, to determine the terminal type based upon the terminal ID. In yet another embodiment of the invention, the user is given an option to select from one of several GUI screen display modes. For example, the user may be given the option to select either a FULL or REDUCED GUI screen display wherein the display modes relate to the capacity of the user display terminal.

As another aspect of the invention, the session interface ID module examines the signal path through which the GUI screen page is to be delivered to the user terminal. For example, if the signal path includes a wireless branch, it may determine to transmit a GUI screen page that would have a smaller memory or data transport capacity requirement.

In yet another embodiment of the present invention, the session interface module transmits a signal to the user terminal to measure a response time. The GUI screen display module then selects GUI screen display page types according to the response time. For this embodiment, it is assumed that a response time corresponds to a network data transport capacity. Accordingly, a GUI screen page requiring the transmission of lesser amounts of data is selected for those network paths whose transport speed is lower.

In operation, a user connects to TKET server 208 with his terminal 204 to enter or review time and/or expense information. Session interface module 220 determines the user terminal type, if necessary, by sending a message to the user to prompt the user to select a GUI screen display page type or mode. The GUI screen display module then builds and transmits a GUI screen display page based upon the GUI screen selector signal value created by the session interface module 220 and based upon the user specific GUI screen page information stored within database 216.

The above described embodiment includes having multiple GUI screen pages for each user, if necessary. In an alternate embodiment, each user defines only one GUI screen page. The parameters of the page include graphical information including unique fonts, color patterns, graphical symbols and related spacing and layout of all of these GUI

screen page elements and aspects. If, however, the GUI screen selector signal indicates that the user terminal has a reduced data capacity in terms of processing speed or memory, the GUI screen display module builds a GUI screen display page that omits certain elements of the page. For example, if the user terminal type is a PDA having only black and while color capability, the GUI screen display module would build a GUI screen page without color information. Additionally, the GUI screen display module may build a GUI screen page that omits certain graphical signals. Thus, for this embodiment, the GUI screen page is said to be "implied" from the stored GUI screen page.

Sub  
As  
In yet another alternate embodiment of the invention, the GUI screen display module builds an implied page based upon on of several different user created GUI screen pages stored within database 216. For example, if the GUI screen selector signal indicates that the smaller (in memory size) of the two GUI screen pages is to be built for transmission to the user terminal, the GUI screen display module may still build a GUI screen page whose elements are implied from the selected GUI screen page. To illustrate, the user may have selected a smaller GUI screen page, but based upon the user terminal type, the amount of information of the smaller GUI screen page may still exceed the capacity of the user terminal. Thus and even more limited GUI screen must be

ASD  
created or "implied" from the selected screen. For example,  
if the user terminal is a cellular device having limited  
display and at a processing capability, the GUI screen page  
may be reduced to being little more than a string of  
5 alphanumeric characters even though the selected server was a  
"REDUCED" GUI screen.

FIGURE 3 is a functional block diagram that illustrates  
an expanded TKET server system coupled to a user terminal  
according to one aspect of the present invention. The system  
10 of FIGURE 3 is similar to that shown in FIGURE 2 except that  
the TKET server of FIGURE 2 is replaced by a network of TKET  
servers. Primarily, the network of TKET servers shown  
generally at 300 illustrate that the components (individual  
TKET servers) of the TKET server network are coupled to  
15 communicate with each other to produce a scaleable TKET  
server network that can be formed to satisfy system  
requirements. As may also be seen, the TKET server network  
comprises application servers that are coupled to the users  
through a plurality of web servers.

Sub A9  
FIGURE 4 is a software system configuration chart that  
illustrates to various software layers according to an  
embodiment of the invention. More specifically, the chart of  
FIGURE 4 illustrates relative arrangement and Each layer  
represents different levels of abstraction with respect to  
25 the software and its functionality in a TKET server.

498  
5 The lowest level layer is the database interface layer 410. Database interface layer 410, as its name implied, is the layer at which computer instructions cause a TKET SERVER processor to interact with a database within a storage device to obtain specific user selected GUI screen display parameters as well as stored user data. The second layer is the coarse object layer 420. The course object layer 420 is the layer at which the programmer can access a whole table of objects as one object.

10 The third layer is the fine object layer 430. The fine object layer is the layer at which single objects represent one user, one project, or one such other object in the system. The fourth layer is the presentation layer 440. A presentation layer is a layer at which HTML, WAP or HDML is  
15 prepared for the user and user input is passed back to the program. For example, the computer instructions at the presentation layer are those instructions that prompt a processor to generate the appropriate type of GUI screen. The fifth layer is the common gate interface (CGI) script  
20 layer 450. CGI layer 450 is the layer at which presentation data is passed up to the web server.

Sub A10  
25 FIGURE 5 is a functional block diagram illustrating the relationship between users with respect to a TKET server formed according to the present invention. TKET SERVER 504, an application server, is coupled to communicate with a

plurality of users by way of a communication network. A user terminal 508 is coupled to communicate with TKET server 504 and to receive GUI screen displays therefrom. Additionally, user terminals 512 and 516 are coupled to communicate with TKET server 504. Dashed lines 520 and 524 are shown between user terminal 504 and user terminals 508 and 512 to illustrate a business relationship between the users of the respective user terminals. By way of example, if the user of user terminal 504 desires to establish a time management and tracking service and to establish a service relationship with the Operator of TKET server 504, then the user of user terminal 504 is, for the purpose of this example, the administrator for the time management and tracking company. Thus, the users of terminals 512 and 516 are the clients of the user of terminal 504.

In the illustration of FIGURE 5, there also exists a business relationship between the users of terminals 512 and 516. For simplicity, an illustration of the business relationship between user terminals 528 and 532 and user terminal 516 is shown. User terminal 512, has business relationships with other lower ability users that are not shown herein.

One reason that the business relationships are indicated in FIGURE 5 for exemplary purposes is to illustrate why each layer of users has different ability levels. Thus, for

example, user 508 may be an administrator for the time keeping and expense tracking function subscribed or used by each of the lower ability level users 512, 516, 528 and 532 and supported by the operator of TKET server 504. Similarly, 5 users 512 and 516 may be managers for the time keeping and expense tracking function. Users 528 and 532 may be mere users. Alternatively, they too may be managers having yet lower ability level users. For example, if each of the users 528 and 532 represent a company, each company may have 10 organizational units such as section, departments, or divisions that are lower ability level users. A better understanding of the abilities of the different level users is explained in the discussion relating to FIGURE 8.

FIGURE 6 is a chart that illustrates the hierarchical relationship between different users wherein the hierarchical relationships defined levels of ability to define the characteristics and arrangement of a GUI screen page according to a preferred embodiment of the invention. The chart of FIGURE 6 illustrates the relationship of three 20 hierarchical ability levels of users. The first hierarchical level shown generally at 604 represents an application service provider (ASP) that also serves as an administrator for the example shown herein. The administrator originally receives a GUI screen page that is set up according to a

plurality of default settings. Being administrator, however, the objects of the GUI screen page may readily be modified by the ASP/Administrator.

5 The second hierarchical level shown generally at 608 includes five users 612, 616, 620, 624 and 628, each of which may have additional lower level users as shown at hierarchical level 632. For example, user 628 further includes four lower ability level users 636, 640, 644 and 648. While not shown specifically herein FIGURE 6, each of  
10 the users of level 632 may also have additional lower levels users. For example, if each user of level 632 represents a different company, there may still exists several lower layers according to the size of the company and the number and arrangements of the divisions of the company.

15 Continuing to refer to FIGURE 6, each level of user receives a GUI screen page having a default arrangement and object labels and contents. According to the selections of all of the users above the present user in terms of what may or may not be modified, the present user may modify the  
20 arrangement and label values and well as content of the rows, columns and objects of the GUI screen page. A better explanation of the relative abilities of users is explained in the discussion of FIGURE 8 below.

In general, however, each user receives a GUI screen  
25 page having a default set of values that is determined by the



higher level of users. Thus, the ASP/Administrator of group 604 has a first set of default values. The users of group 608 receive GUI screen pages whose default settings are determined by the ASP/Administrator 604. Similarly, the  
5 lower level users of group 632 receive GUI screen pages whose default values are determined by the ASP/Administrator and by the higher level user of group 608 to which the user of group 632 belongs. For example, user 628 and ASP/Administrator 604 determine the default settings of users 636, 640, 644 and  
10 648. In general, each hierarchical level of FIGURE 6 has a different set of GUI screen default settings according to the relative placement of the user.

While the table of FIGURE 6 illustrates only three levels of users, it is understood that there may be  
15 additional levels below the third level shown generally at 632. While there may not be any higher levels than shown in FIGURE 6, it generally is possible to have additional levels in either direction if the highest level shown is not the ASP as is the case in FIGURE 6.

*Sub A12* The hierarchical relationship between the users affects more than screen definitions. More specifically, access control lists may be defined that specify access to specified information or lists of information. Generally, each user may transparently view the GUI screen screens of all lower  
25 level users. If a user belongs to multiple groups, for

example, wherein there are a plurality of lower level users within each group, the user will have the ability to transparently review or even to modify the content of the GUI screen screens of the lower level users in each group. Each of the lower level users, however, can only review the GUI screen pages of their lower level users. They may not review the GUI screen pages of users at the same or at higher hierarchical levels. In such a case, the user is "hidden" from those users whose screens he cannot access.

Moreover, because project codes are similar to expense accounts, it is often desirable to prevent the project codes from being viewed by lower level users in a selective manner. Thus, a user, e.g., a manager level user, may select what codes may be viewed by the users in a given group through the access control lists. If a lower level user also acts as a manager for his lower level users, the upper level manager will have access to view the codes and access control lists defined and controlled by the lower level manager.

The function of hiding project codes may also be performed on a per user basis through the use of the access control lists. Thus, a manager may specify in an access control list those lower level users that have access to a given code.

FIGURE 7 is an exemplary display of a GUI screen according to one embodiment of the invention. The screen of

FIGURE 7 includes five groups of information 702, 704, 708, 712 and 716. As has been discussed above, different users have different ability levels in terms of the extent to which they may make selections for the characteristics of a GUI screen. The example of FIGURE 7 illustrates a screen that is observed by a user not having the highest ability level. Thus, the screen received by the user of the screen of FIGURE 7 includes groups 702, 704 and 708 whose objects are not modifiable. By way of example, group 702 includes an object reserved for displaying a corporate logo while group 704 includes an object of displaying a corporate name. Group 708 includes at least one object that includes departmental identifiers. Similarly, group 716 includes an object for displaying a banner or advertisement that may not be modified by the user of the screen illustrated in FIGURE 7.

The objects of group 712, however, are modifiable by the user of the screen shown in FIGURE 7. For the example herein, the objects of group 712 are for storing the actual time or expense entries. Moreover, the actual arrangement of the columns and rows of group 712 are modifiable. Thus, based upon user selection, rows may be displayed as columns or vice versa. Additionally, the actual names given to these rows or columns are modifiable. In the preferred embodiment of the invention, the screen is initially received by the user with a set of default names and values. Then, for each

row or column, the user may activate a pull down menu to select from one of a group of alternate names. In an alternative embodiment of the invention, the user may also type in a name if one of the alternative names does satisfy  
5 the user's requirements. For example, a row labeled as "entertainment" may have alternate names including "dining", "alcohol", or "sporting events". In the alternate embodiment of the invention, the user may choose to type a label that does not exist such as "Golfing Fees" if, for example, the  
10 user entertains clients on the golf courses.

The TKET server 700 supports fully customizable GUI screens, which are the presentation, made to the user when requesting time entries and/or expense information. Each time entry typically includes at least five components: (1)  
15 an identity, e.g., the user's identity; (2) a corresponding date or date range for the time entry; (3) the duration of time for the time entry, or alternately starting and stopping times for the time entry; (4) elements of the time entry, e.g., project code, project sub-code(s), time categories and  
20 subcategories, etc., and (5) comments regarding the time entry. In the described embodiment, even the name, size and arrangement of the comments field (object) is configurable by the user. As may be seen from examining group 712 in FIGURE 7, the top row of object titles represent the default  
25 settings that are provided by a higher level user while the

dashed objects below the top row of object titles represent, more generally, that a pull down menu may used to allow the user to select from a list of object names for each object.

The chart of FIGURE 7 illustrates, therefore, a time entry GUI screen session for an employee having the lowest ability level/role for defining the screen display parameters. The objects of group 712 may be arranged by the user in any order or may even be renamed by the user.

Sub A13  
10

FIGURE 8 is an illustration of a series of GUI screen screens that collectively illustrate a concept of users having differing and relative levels of atomic abilities for modifying the contents and arrangement of GUI screen screens according to one embodiment of the invention. Referring now to FIGURE 8, each of the three GUI screen screens contains 15 five rows and one column of objects. In the first GUI screen 810, it may be seen that all five objects 811 through 815 are highlighted (as indicated by the box around the object) to indicate that each of the objects may be modified. The GUI screen of FIGURE 8 is one that is under the control of a TKEK 20 server administrator having the highest level of ability to modify the objects within the screen. Accordingly, all five objects are modifiable by the user (administrator). An access list stored within the TKET server defines the access level of the user. From the stored information, the TKET 25 server determines that all five rows are modifiable by the

user to whom the screen 810 is to be transmitted. Accordingly, each of the five objects is sent in a format to enable the receiving user to make modifications.

The screen shown at 820 shows the same five objects 511 through 815 of screen 810 but that only objects 812 through 815 are highlighted. That object 811 is not highlighted indicates that the user of screen 820 has a lower ability level and, more specifically, cannot modify the display or content of object 811. In general, if object 811 represents a value or symbol that the administrator does not want its lower level users to modify, then the contents of that object appear for all of the lower ability level users.

The screen shown at 830 also includes the same five objects but only objects 813 through 815 are highlighted illustrating that the user of screen 830 may not modify objects 811 and 812. While object 811 was made un-modifiable for both of the lower ability users of screens 820 and 830, the user of screen 820 made object 812 un-modifiable for the user of screen 830. While not explicitly shown in FIGURE 8, it should be understood that there might well be additional screens that represent additional lower ability users. For example, the user of screen 830 may represent a company. In such a case, each of the lower ability screens would relate to organizational units of the company. No particular limit as to the number of ability levels is intended by the

illustration of FIGURE 8, which includes only three ability levels.

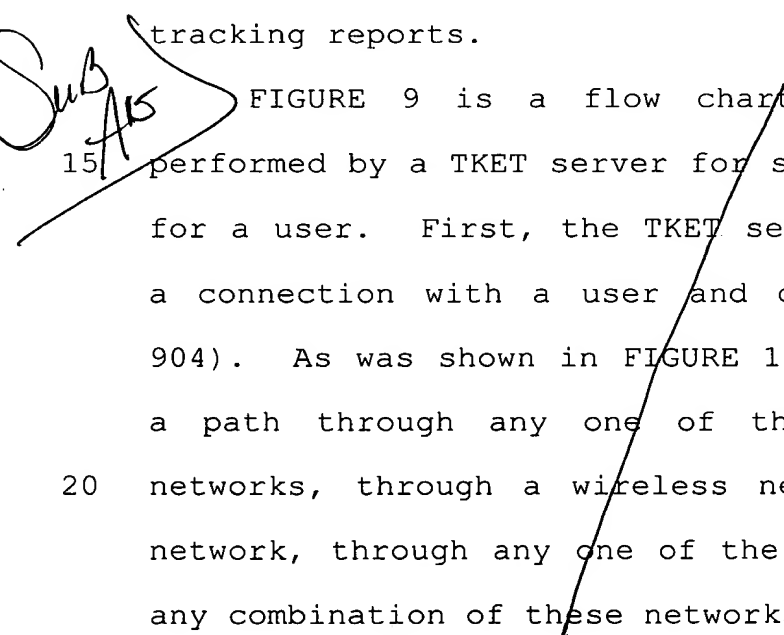
Continuing to refer to FIGURE 8, it may be seen that a reporter 840 is coupled to receive each of the GUI screen screens 810, 820 and 830 from the user terminals displaying them. A reporter may be any type of device that is for storing or displaying information of the type being supported on each of the GUI screen screens. By way of example, if the system of FIGURE 8 relates to time entry, the reporter may be a terminal and screen of a supervisor that is monitoring the time entries of each of the users of the three GUI screen screens 810, 820 and 830. Alternatively, the reporter may be a report generating routine stored within TKET server 102 (of FIGURE 1, for example) and executed by a processor within TKET server 102.

While the example of FIGURE 8 includes an illustration of how objects may be changed, it is to be understood that a user also may be allowed by a higher ability level user (e.g., a manager or an administrator) to change other features of the GUI screen including color, font type, etc. Moreover, as mentioned before with respect to FIGURE 7, even the lowest ability level user has the capacity to rename objects. Thus, for a reporter 840 to be able to meaningfully monitor the time keeping and expense tracking of the user, a

database or table is needed to map the changes made by the user from the default settings provided to him.

The database or table thus enables the reporter to analyze numbers and add values from different users having 5 different names but representing the same basic parameter. For example, one user may track a term named "Hourly value" while another user tracks a term name "Client cost" wherein both numbers represent the amount that the client or project is to be charged for the contract employees time and effort.

10 Thus, if the mapping of object names is found within database 216 of FIGURE 2, for example, reporter 840 must communicate with database 216 to properly generate the time and expense tracking reports.

*Sub A15*  
15  FIGURE 9 is a flow chart that illustrates a method performed by a TKET server for setting GUI screen preferences for a user. First, the TKET server receives and establishes a connection with a user and determines the user ID (step 904). As was shown in FIGURE 1, the connection may comprise a path through any one of the public switched telephone 20 networks, through a wireless network, through a local area network, through any one of the various internets or through any combination of these networks.

After the connections is established, the TKET server determines the user's role and associated abilities for 25 defining and modifying objects of a GUI screen (step 908).



For example, if the user role is that of an administrator, the TKET may allow the user to make any change from an original default screen that is desired (unless, of course, the TKET server operator chooses to make one or more objects  
5 fixed (e.g., a small logo inconspicuously displayed). Alternatively if the user is a lower ability level user relative to the administrator, then the TKET server must determine the objects that the user is allowed to modify or change.

10       Once the TKET server determines the user role and corresponding abilities, it provides the options to the user for making changes to the GUI screen page (step 912). As indicated before, these options are options for modifying GUI screen display parameters of a default page. In an alternate  
15 embodiment, however, a default page is not provided for the highest ability level user. For this embodiment, the highest level user (administrator) must define the layout of the GUI screen page. The default page of course is the page settings created by a user that is one ability level higher than the  
20 present user and includes the selections of all users that are at a higher ability level than the present user. In the case of the highest ability level user (e.g., an administrator), the GUI screen default page is created by the operator of the TKET server for the purpose of providing the

administrator a starting point for creating and defining his GUI screen page.

Thereafter, the TKET server receives the user's GUI screen page definitions (step 916). The definitions can be  
5 in the form of fixed data values, text (e.g., formulas for making calculations that are to be displayed), and row and column names, row and column arrangements.

After each GUI screen definition is received, the invention includes accepting and modifying the GUI screen  
10 definitions from the default value(s) (step 920). This step includes storing the received GUI screen definitions with respect to the user ID. After each GUI screen definition is received, the invention includes determining whether the user is through making changes and defining his GUI screen or  
15 whether to present the GUI screen modification options to the user once again to receive more changes (step 924). For example, the TKET server may transmit a signal asking the user if he has more changes to make. Based upon the response, either step 912 is repeated or the inventive method  
20 of FIGURE 9 is complete.

Each of the above steps for creating a GUI screen page may be performed multiple times to create multiple GUI screen pages. For example, a user realizing that he will want to access the GUI screen page from two different terminals, each  
25 having significantly different data handling capacity, may

want to define a GUI screen page for each of the two terminals. Accordingly, when the user logs into the GUI screen server, he is able to select the desired GUI screen page.

5           FIGURE 10 is a flow chart illustrating a method for generating a GUI screen page to a user and for receiving data inputs from the user for storing and processing. Initially, when the user logs in, the TKET server examines the user ID so that it may determine the necessary information for  
10       generating a GUI screen page to the user (step 1004). Thereafter, the TKET server determines the group IDs and memberships that correspond to the user ID received from the user (step 1008).

*Sub A16*  
15       As a part of determining how to set up a GUI screen page, the invention includes determining what type of communication channel is to be used to transmit the created GUI screen page (step 1012). For example, this step includes determining whether the GUI screen page is to be transmitted via wireless data link, through a low bandwidth serial line  
20       by way of a modem such as a typical 56K byte/sec desktop computer modem, or through high speed serial digital communication link utilizing a T1 or T3 line. More generally, this step includes determining the data throughput capacity of the data link for slowest known data link between  
25       the user terminal and the TKET server.

Knowing the data throughput capacity by determining the type of communication channel is important for determining what features to include in the page for transmission to the user. One part of determining data throughput capacity of the data link is determining what the appropriate protocol for generating and transmitting the page should be. For example, hypertext markup language (HTML) is appropriate for a full GUI screen page being transmitted to a desktop terminal. Similarly, hand held device markup language is appropriate for PDAs and other hand held devices while wireless application protocol (WAP) is appropriate of wireless devices or terminals.

Finally, in order to determine the characteristics of the GUI screen page that is to be created, the TKET determines the terminal type (step 1016). For example, if the terminal type is a PDA, its capacity for receiving GUI screen displays having color information will likely be notably lower than the capacity of a desktop computer. Similarly, if the PDA is to receive the GUI screen page over a wireless link, then the amount of information that may be transmitted must be reduced even further. Accordingly, a simpler GUI screen page should be created.

In addition to the above steps of analyzing the system parameters that affect how much information may be used to form a GUI screen page for transmission to the terminal, the

inventive method includes determining what user profiles have been previously defined for the user. Thus, the invention includes obtaining the user profiles that, in the preferred embodiment, are stored in a database and may be accessed by the user ID (step 1020). Additionally, besides determining what the defined objects are for the user and how they should be arranged on a GUI screen page, the data content of the objects must be retrieved so that the GUI screen page may be populated with the user's data (step 1024).

10 At this point, the TKET server has determined the necessary information for building the GUI screen page. Thus, the next steps include building the GUI screen page (step 1028), transmitting it to the user (step 1032), receiving data entries from the user for some of the various  
15 objects of the GUI screen page (step 1036), and storing the data in a database (step 1040).

The above listed method steps for creating a GUI screen page according to network and user selected parameters may be practiced in one of several different manners. For example,  
20 in the described embodiment, the TKET server determines the type of GUI screen page that should be built for transmission to the user based upon transmission channel and terminal capacities. For this embodiment, the TKET server analyzes a user terminal ID to determine type of terminal. The user ID

may be selected and entered by the user or it may be embedded in a set of setup signals transmitted by the terminal.

With respect to the transmission channel, TKET server analyzes the source of the incoming communication link. By way of example, if the communication link is received by the TKET server from a mobile switching center of a wireless network, then the TKET server determines that a wireless communication link is included in the communication path. In the described embodiment, the TKET server maintains a list of prefix numbers that identify the mobile switching centers. The list of numbers and their originating sources may be operated in a manner similar a telecommunication network service control point.

In an alternate embodiment of the invention, the first time a user establishes a link to a TKET server for a session, the server merely sends a signal to the terminal to prompt it to generate an immediate response in order to measure a response time. By measuring the response time, the TKET server is able to roughly determine data transport capacity through the established communication link for that session. Accordingly, it is at least partially from this approximation that the TKET server selects the size and complexity of the GUI screen page that it builds for transmission to the user terminal.

In yet another embodiment of the invention, the TKET server initially selects one of a plurality GUI screen formats according to terminal type. Thereafter, GUI screen elements are implied according to the communication channel performance. For example, if the select GUI screen that corresponds to terminal type includes color information, but the communication channel response time does not allow for color information to be transmitted without incurring a delay beyond a specified amount, the TKET server may create an implied GUI screen that does not include color information. Thus, as may be seen, the invention includes determining the complexity of the GUI screen that is to be built not only by operator selection, but also by system capabilities or performance.

The actual parameters that are to be selected or discarded for those embodiments in which a full set of GUI screen display signals is not to be generated by the TKET server makes the determination may readily be modified according to implementation of the inventive methods herein. In general however, they include decisions about whether to transmit color information, whether to transmit graphical symbols, logos and designs or even font information, whether to transmit specified advertisements, and whether to transmit certain arrangement information.

FIGURE 11 is a functional block diagram illustrating a TKET server in communication with a user terminal according to an alternate embodiment of the invention. Referring now to FIGURE 11, it may be seen that a TKET server 1100 is in communication with a user terminal having a display screen 1104. As may be seen from viewing screen 1104, three URLs representing different display options from which the user may choose are being displayed. Each display option represents different display nodes.

First, option 1108 labeled "Full" is for enabling the user to select a full GUI screen display node. Option 1112 is for enabling the user to select a reduced GUI screen display while option 1116 is for allowing the user to select a minimum display. The user selection is then transmitted by the user terminal in a user selection signal 1120 that is transmitted to TKET server 1100. A display module 1124 within TKET server 1100 is operable to receive signal 1120 and to generate display signals to create a GUI screen display responsive thereto.

While the example of FIGURE 11 illustrates the user being given URLs to select GUI screen display signal characteristics being transmitted by the TKET server, other approaches may be employed. More specifically, the URLs are used to cause the communication link to establish a communication link to an internet address. The TKET server,



1178  
5 generates GUI screen display signals having characteristics that correspond to the URL. Thus, for the example of FIGURE 11, because three URL addresses are shown, the TKET server has at least three different sets of URL signal display characteristics to generate responsive thereto. In an alternate embodiment of the invention, however, a GUI screen display may prompt the user to select from a plurality of display characteristics. The user choice is then transmitted to the TKET server for it to generate GUI screen display  
10 signals having characteristics that are responsive thereto.

In one embodiment of the invention, each of the options presented to the user on screen 1104 is one that triggers a different URL, which causes signal 1120 to be transmitted to different destinations. In another embodiment of the  
15 invention, each of the choices is merely identified and reflected within signal 1120. Accordingly, display module 1124 extracts the selected choice from signal 1120 and generates the display signals to create a GUI screen that is responsive thereto.

20 FIGURE 12 is a table illustrating a method within a TKET server for generating a GUI screen display at a remote terminal according to one embodiment of the invention. In the described embodiment, the display module of TKET server 102 analyzes the terminal type to select from one of at least  
25 four different display types. For example, as is shown in

column 1204, desktop computers and laptop computers receive a set of display signals for generating a "full" GUI screen display. In other words, a fully defined GUI screen display is generated at the remote terminal responsive to a set of signals that cause such a display being received by the remote terminal and transmitted by the TKET server. Column 1208, however, illustrates a reduced set of display signals that might be transmitted to what is being referred to herein as a mini laptop. A mini laptop, as defined herein, is a device that, in terms of data storage and processing capacity, is somewhere between a PDA such as a Palm Pilot® and a laptop computer. Many companies are now starting to produce very powerful PDA's that contain communication transceivers capable of supporting reasonably high data throughput rates but that do not provide the power and speed of a modern laptop.

Column 1212 illustrates that for certain types of terminals, such as a PDA, a minimal set of display signals are to be transmitted thereby resulting in the user terminal displaying a minimal GUI screen display. For example, if the user terminal is a wireless PDA, then a set of display signals that would generate a minimal GUI screen display are transmitted by the display module of the TKET server. Finally, if the terminal is merely a telephone having a very limited display capacity, as is shown in column 1216, the

display signals may comprise little more than text and control signals for the text. Alternatively, if the user terminal is a telephonic device, the "display signals" may comprise nothing more than voice information generated by an  
5 IVR. Alternatively, the display signals for phones might be a combination of text and voice signals.

For each of these types of devices, there are multiple ways that the display module and/or other modules within the TKET server 102, of FIGURE 1 for example, may determine the  
10 type of user terminal. The protocol being used by the terminal in establishing a communication link with the TKET server can be very revealing as to the type of terminal. For example, if TKET server 102 of FIGURE 1 receives a signal from the network, it analyzes the received signal to  
15 determine whether the remote user terminal is using an HTML, an HDML or a WAP protocol for communicating. If the terminal is using HTML, then it probably is a device having the capability of a desktop, a laptop or other similar computer. If the protocol is a WAP protocol, then the TKET server may  
20 determine that the communication path includes a wireless link. If the protocol is an HTML protocol, the TKET server may determine that the backup user terminal is a PDA.

FIGURE 13 is a table illustrating a method for determining whether to generate a set of signals for  
25 displaying either a full, reduced or minimal GUI screen

display based upon communication path characteristics according to one aspect of the present invention. Referring now to the exemplary system described FIGURE 13, it is seen that one of at least three different display modes of full, reduced and minimal are illustrated in columns 1304, 1308 and 1312, respectively. It should be understood the invention includes having different numbers of display nodes. Additionally, rows 1316, 1320 and 1324 illustrate different communication path characteristics that influence the display mode or type of GUI screen display screen that is generated by the TKET server.

Examining row 1316, if the communication link is an integrated services digital network (ISDN), a T1, a new generation wireless (for example, 3G) communication link or if the communication link is transceived by a modem having a modem bit rate that equals or exceeds 56K, then the TKET server generates a full GUI screen display. Alternatively, if the user terminal modem is slower than a 56K modem or a wireless communication link that is older than a 3G wireless communication link, then the TKET server generates a reduced GUI screen display. Alternatively, if the wireless communication link includes transmission from a satellite system, the known latencies associated with satellite transmissions as well as the expense for a satellite link prompts the TKET server to transmit a minimal set of display

signals that will prompt the receiving user terminal to generate a minimal GUI screen display.

Referring now to row 1320, it may be seen that the number of gateways can also influence whether a full, reduced or minimal set of display signals are transmitted for the generation of the GUI screen display screen. In one embodiment of the present invention, if the display signals have a communication path that includes only a number of gateways that is less than a defined number "A", then a full GUI screen display is transmitted unless there is a different reason for reducing the magnitude of the GUI screen display screen. However, if the number of gateways is within a range, by way of example, between the numbers A and B, then a reduced set of signals are transmitted to create a reduced GUI screen display. Finally, if the number of gateways exceeds the number B, then a minimal set of display signals are transmitted to create a minimal GUI screen display. In one described embodiment, A is set equal to one and B is set equal to three.

Row 1324 illustrates that geography may also be used to determine whether to transmit a full, reduced or minimal set of display signals to create corresponding GUI screen display screens. For example, if the display signals are being transmitted through the various networks to a geographic location that is within the North American continent, then a

full set of display signals are transmitted. If, on the other hand, the signals are being transmitted either to Central America, South America or Europe, then a reduced set of display signals are transmitted to create a reduced GUI screen display screen. Finally, for all other locations, by way of example, the Far East, the Middle East or Australia or New Zealand, then a minimal set of display signals to create a minimal GUI screen display screen are transmitted. In summary, therefore, the table of FIGURE 13 illustrates that the type of communication networks, the number of gateways, and the geographic location of the receiver or user are all significant parameters in determining whether to transmit a full, reduced or minimal set of display signals to create the corresponding full, reduced or minimal GUI screen display screens in a preferred embodiment of the invention. It is understood, of course, that geographic restrictions are exemplary. Moreover, even if there are actual restrictions today, improvements in data transport technologies will lead to different geographic constraint parameters.

Sup 20  
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FIGURE 14 is a flow chart that illustrates a method according to the present invention. Referring now to FIGURE 14, the method may be explained in view of the various networks illustrated in FIGURE 1. For the present method, TKET server 102 is operable to receive calls that originate from landline phones, by way of example, phone 124 coupled to

A 188  
a telephone network 106, and calls that originate from a wireless terminal, e.g., wireless terminal 120, 121, or 122 in a wireless network 110. Each of these calls, in the described embodiment are transmitted through a gateway device  
5 similar to gateway device 108 of FIGURE 1 where they are converted from an original form (e.g. analog, time division multiple access (TDMA), code division multiple access (CDMA)) and put into an IP packet format to be transmitted through the internet 104 directly to TKET server 102.

10 In the described example, TKET server 102 is coupled to communicate with an integrated voice response unit 138. Accordingly, when TKET server 102 receives data packets from internet 104 that originated from a phone, by way of example, telephone 124, or wireless terminal 120, TKET server 102  
15 prompts IVR 138 to play a request for an ID. IVR 138 either produces that voice request in a digitized form or analog form. If it is produced in an analog form, TKET server 102 is operable to convert the analog signal to digital and to transmit it over the internet 104 through the corresponding  
20 gateway 108 or 112 to the telephone 124 or wireless terminal 120. According to the type of system, the signal is eventually converted to an analog signal for playing through a phone speaker. Thus, the initial message generated by IVR 138 is to prompt the user to state or enter his ID (step  
25 1402).

Thereafter, through the network and various conversions described above, TKET server 102 receives and stores the response (step 1404). The manner of receiving and storing responses from IVRs is known. Thereafter, the TKET server  
5 prompts the IVR to play a message to prompt the user to select either start or stop (step 1406). The response is then stored (step 1408). Additionally, TKET server prompts the IVR to request an account code, which is then played and transmitted to the user (step 1410). Again, the response is  
10 stored (step 1412).

*Sub A19* As may be seen from examining the method of FIGURE 14, the invention includes a TKET server that is coupled to an IVR to prompt the IVR to play select messages. The select messages are then placed into a digital form, transmitted in  
15 data packets through the internet and then converted by a gateway into a format that is appropriate for the telephone network through which they are to be transmitted. Thereafter, the converted signals are transmitted through a telephone network to the destination user terminal telephone.

20 In an alternate embodiment of the invention, many of the computer instructions that, upon execution, result in the method steps being performed, may also be implemented within a telecommunication switch. For this embodiment, the switch itself is coupled to the IVR to generate the messages. The  
25 computer instructions stored within the switch would then



prompt the IVR to request an ID, request the user to select between start and stop, and to request the IVR to enter a message to request the user to enter an account code, and finally to store each of the responses as shown in steps 1404 through 1412. An additional step, however, is that the switch must generate and transmit a message to the TKET server containing the user ID, the start/stop selection, and the account code at a minimal so that the TKET server may start or stop tracking time as is appropriate. Thus, step 1414 is indicated as optional depending on what device performs the inventive method.

If the inventive method is performed by a telecommunication switch, then, in the preferred embodiment, the generated message is formed using an HTTP protocol and is transmitted over the internet.

FIGURE 15 is a flow chart illustrating an inventive method for receiving time tracking signals from a telecommunication switch according to a preferred embodiment of the invention. Referring now to FIGURE 15, the method includes receiving the message (step 1502). As described before, in the preferred embodiment of the invention, the message is received using an IP protocol. The TKET server then extracts the user ID (step 1504), extracts the account code (step 1506), and extracts the start/stop status (step 1508). Thereafter, the TKET server stores the time entry

event that is defined by the extracted signals from steps 1504 through 1508 (step 1510). Thus, in relation to an account code, the user ID is stored along with a start/stop status. The TKET server also determines the total amount of  
5 time that the user entered for the given account code.

In addition to extracting the account code, start or stop status and the user ID, the TKET server evaluates whether additional information is required. If additional information is required, then it generates a GUI screen  
10 display signal to request information according to terminal type (step 1512). For example, if the terminal type is a telephone, then the display signals will comprise little more than text. If the terminal is a desktop or lap top computer, then the TKET server will generate a set of display signals  
15 to cause the user terminal to generate a full GUI screen to request additional information.

FIGURE 16 is a functional block diagram illustrating a network for facilitating timely electronic time entries and approvals according to a preferred embodiment of the  
20 invention. Referring now to FIGURE 16, a TKET server 1604 is coupled to communicate with a plurality of employer terminals 1608 including an accounting department terminal 1612, an employee manager's terminal 1616 and an employee's terminal 1620. The TKET server 1604 specifically exchanges time  
25 entries and billing information with each of the employer

terminals 1608. Additionally, TKET server 1604 is coupled to communicate with a contract employer terminal 1624 to transmit billing information thereto.

TKET server 1604 include an award processing module 1628  
5 for determining whether an employee of the employer, e.g., an employee manager, has approved employee time entries according to a process and by a deadline to qualify the employee manager for a specified award. More specifically, an internal storage device of TKET server 1604 includes  
10 computer instructions that define the specific process 1632 that must be followed for entering and approving time that qualifies the manager for an award. Additionally, the storage device stores a schedule 1636 that defines the deadlines by which entries must be made and approved to  
15 qualify the employee (here, the manager) for an award.

In operation, the employee terminal 1620 communicates with TKET server 1604 to obtain GUI screen display signals that include account codes to which the employee may charge his time. The employee responds by entering time entries in  
20 the provided fields or objects of the GUI screen created by the TKET server 1604. The entered time is therefore transmitted to the TKET server with an indication that they are final and are to be submitted for payment.

Upon receiving the final time entries from the employee,  
25 the TKET server transmits the time entries to the manager

terminal 1616 of employer terminals 1608 for approval. Upon receiving an approval from the manager terminal 1616, TKET server sends a summary of approved time entries to the accounting terminal 1612 and to the contract employer terminal 1624 if the employee of employee terminal is a contract employee of the employer of employer terminals 1608 and is actually employed by contract employer 1624.

In response to the various time entries, approvals and reports listed above, an accounting department will issue a check to the employee if the employee is a direct employee of the company. If the employee is a contract employee, the contract employer generates a paycheck to the employee responsive to contract employer terminal 1624 receiving the approved time entries from TKET server 1604. Additional, and responsive to receiving the approved time entries, the contract employer terminal 1624 initiates an invoice to the accounting department (in the described example) of the employer for payment for the contract employee's labor.

FIGURE 17 is a flow chart illustrating a method for entering and approving time entries according to a preferred embodiment of the invention. Initially, a TKET server receives time entries from an employee (step 1702) and, responsive thereto, transmits the time entries to an employee manager for approval (step 1704). It is understood that the employee must log in to the TKET server through his employee

terminal to establish a connection and to transmit the time entries thereto as described herein this disclosure. Similarly, the employee manager must log in through his terminal and establish a connection to receive the time  
5 entries for approval as is described herein this disclosure.

After transmitting the time entries to the employee manager, the TKET server receives an indication that the manager has approved the time entries (step 1708). After receiving approval, the TKET server transmits the approved  
10 time entries to an accounting department terminal (step 1712), to a contract employer (step 1716) if the employee is a contract employee that is a direct report to the contract employer. Thereafter, the TKET server determines if the employee that is subject to qualifying for an award, e.g.,  
15 the employee manager, entered the time entry approval by a specified deadline (step 1720) and whether the review and approval was conducted according to a prescribed process (step 1724). If the specified conditions were satisfied, the TKET server issues an award (step 1728). In the preferred  
20 embodiment of the invention, the TKET server maintains a bank of frequent flyer miles that were purchase or obtained from an airline for use as an award to the employees that use the system in the preferred manner.

The inventive method and apparatus disclosed herein are  
25 particularly advantageous in that they provide a capability

for encouraging employees to utilize the capabilities of the present inventive system to make time entries and approvals on a timely basis in order to facilitate accurate and prompt time keeping. Such a process enables accounts to be promptly  
5 credit and/or paid for employee labor. It also enables managers to maintain better control on expenses and budgets.

FIGURE 18 is a functional block diagram illustrating the circuitry within a time keeping and expense entry server according to one embodiment of the present invention. As may  
10 be seen, a TKET server 1800 includes a processor 1804, a memory 1808, a temporary memory 1812, and a bus controller 1816, each of which is connected to a bus 1820. Memory 1808 is formed of a hard drive while temporary memory 1812 is formed of random access memory. In general, memory 1808 is  
15 for storing computer instructions that define the operational logic of the server 1800 as described herein this application with particular reference to the illustrated methods and processors. Thus, processor 1804 receives the computer instructions by way of bus 1820 and executes them. The  
20 processor, as needed, temporarily stores data, by way of bus 1820, within temporarily memory 1812. The processor may be any known type of processor. While the permanent memory in the described embodiment is a hard drive, any type of memory capable of retaining information through power cycles may be  
25 used. As may also be seen, a network interface 1824 is

connected to the controller 1816 to enable the server 1800 to communicate with other external devices.

The modules described in this application are formed logically by the processor's execution of the stored computer instructions. The server and/or modules may, in alternate  
5 embodiments, be implemented by application specific integrated circuits or other known circuit design approaches made to implement a specified logic design.

While the invention is susceptible to various  
10 modifications and alternative forms, specific embodiments thereof have been shown by way of example in the drawings and detailed description. It should be understood, however, that the drawings and detailed description thereto are not intended to limit the invention to the particular form  
15 disclosed, but on the contrary, the invention is to cover all modifications, equivalents and alternatives falling within the spirit and scope of the present invention as defined by the claims. As may be seen, the described embodiments may be modified in many different ways without departing from the  
20 scope or teachings of the invention.